

**City of Durham  
Transportation Division**

May 10, 2010

**Memorandum**

To: Durham City-County Planning Department  
From: Bill Judge, P.E., Transportation Engineer IV  
Subject: Glenn School Road Commercial Development (Z0900019) Traffic Impact Analysis

The City-County Unified Development Ordinance requires that a Traffic Impact Analysis (TIA) be prepared for proposed developments estimated to generate 150 or more vehicle trips during the peak hour. The proposed Glenn School Road Commercial Development is located on the south side of Glenn School Road west of Interstate 85. The proposed development consists of the following proposed land uses:

- A convenience store with fourteen fueling positions
- A 5,000 square foot fast-food restaurant with drive-through

Ramey Kemp and Associates prepared a TIA report for the proposed development in December 2009 with an Addendum in April 2010. The TIA analyzed both the AM peak hour and the PM peak hour traffic volumes. The proposed development will generate 479 AM peak hour trips and 436 PM peak hour trips. The build-out year of the proposed development is expected to be 2012.

**Study Area**

The TIA analyzed five (5) intersections in the vicinity of the proposed site. These intersections are:

- Glenn School Road and I-85 Northbound Ramps (unsignalized)
- Glenn School Road and I-85 Southbound Ramps (signalized)
- Glenn School Road and Glenn Road (unsignalized)
- Glenn School Road and Site Driveway #1 (full access, unsignalized)
- Glenn School Road and Site Driveway #2 (left-over access, unsignalized)

**Trip Generation**

Site generated traffic for the proposed development was computed based on ITE's *Trip Generation Manual, 8<sup>th</sup> Edition, 2008*. The TIA included the following trip reductions:

- 57% of the AM peak hour site trips will be diverted trips from the existing vehicle trips on I-85
- 60% of the PM peak hour site trips will be diverted trips from the existing vehicle trips on I-85

The TIA trip generation estimate is shown in the table below:

ITE Land Use (Code)	Size	AM Peak Hour (vph)			PM Peak Hour (vph)		
		Enter	Exit	Total	Enter	Exit	Total
C-Store With Fuel Pumps (853)	14 fuel pos.	116	116	232	134	134	267
Fast-Food With Drive-Through (934)	5,000 s.f.	126	121	247	88	81	169
<b>Total External Trips</b>		<b>242</b>	<b>237</b>	<b>479</b>	<b>222</b>	<b>215</b>	<b>436</b>
Diverted Trips from I-85		137	137	274	130	130	261
<b>External (New) Trips</b>		<b>105</b>	<b>100</b>	<b>205</b>	<b>92</b>	<b>85</b>	<b>175</b>

### Trip Distribution

The assignment of site traffic on the study area roadway network was based on the following trip distributions:

- To/From the North via I-85: 30% of site trips
- To/From the South via I-85: 30% of site trips
- To/From the North via Glenn Road: 10% of site trips
- To/From the South via Glenn Road: 10% of site trips
- To/From the East via Glenn School Road: 20% of site trips

### Approved Developments

Approved developments are defined as approved or pending, but not yet constructed, projects within the vicinity of the subject project. The following approved development was included in the TIA:

- Glenn View Station Outparcel Development -Shopping Center located on the south side of Glenn School Road east of I-85; the vacant portion consists of five outparcels including two 6,000 square foot high turnover sit down restaurants, a 3,000 square foot of fast-food restaurant with drive-thru, a drive-in bank with 3 lanes, and a 14,000 square foot pharmacy with drive-thru.

In addition to the traffic from this proposed development, a uniform annual compounded growth rate of 3% was utilized to determine the background traffic projections.

## TIP Roadway Improvements

NCDOT TIP project #U-4721 (currently unfunded and listed as Strategic Highway Corridor Project), will construct Northern Durham Parkway to connect I-540 near the Research Triangle Park (RTP) area with Roxboro Road in northern Durham. The preferred alignment for Northern Durham Parkway utilizes the existing portion of Glenn School Road near I-85. As part of the Northern Durham Parkway project, this portion of Glenn School Road would likely be converted into a four-lane divided facility with a new six-lane 250-foot long bridge over I-85 to accommodate a projected 2025 demand of 67,000 daily traffic volumes.

The current 180-foot long Glenn School Road Bridge over I-85 was built in 1955 as a two-lane bridge with 26 feet of clear roadway width and 16 feet of vertical clearance. The significant age of the structure will likely prohibit expansion of the bridge before replacement, and any expansion would very likely dictate replacement to meet current NCDOT and FHWA standards. Otherwise, a structure replacement is expected with NCDOT TIP project #I-4743 which includes the widening of I-85 to three lanes in each direction from US 70 to Red Mill Road. This project is also currently unfunded.

## Traffic Impact Analysis

Capacity analyses were performed using Synchro 7.0 for the AM and PM peak hours for the following scenarios:

- Existing (2009) conditions
- No-Build (2013) conditions (2009 Existing + Approved Development Traffic)
- Build (2013) conditions (2013 No-Build + Site Traffic + Site Improvements)

### Glenn School Road and I-85 NB Ramp (unsignalized)

The following table summarizes the LOS for this stop-controlled intersection.

Scenario	AM LOS (delay in seconds)	PM LOS (delay in seconds)
Existing (2009)	A (9.5)*	B (10.9)*
No-Build (2013)	B (10.2)*	B (13.2)*
Build (2013)	B (14.8)*	E (39.3)*

\* Unsignalized operation, with LOS reported for the worst approach (northbound).

The northern leg of this intersection serves as the I-85 northbound on-ramp with two-way traffic to provide access to Summerlin Road. The northbound approach of this intersection (I-85 NB off-ramp) operates at LOS B during the PM peak hour and would continue to operate at LOS B with the projected 2013 background traffic. With site traffic, delay along the northbound off-ramp would increase and LOS would decrease to LOS E. Although a LOS E is undesirable at signalized intersections, a LOS E or F is typical at many unsignalized intersections during a peak hour until such time as a traffic signal is warranted.

The analysis indicates the peak hour signal warrant is satisfied for the PM peak hour. To address potential operation and safety concerns with the excessive side street queuing and delays, the following additional improvement is required:

- Install a traffic signal with interconnect cable to the I-85 SB ramp and Glenn View Station intersection (subject to MUTCD warrants and approval by NCDOT).

Glenn School Road and I-85 SB Ramp (signalized)

The following table summarizes the LOS at this signalized intersection.

<b>Scenario</b>	<b>AM LOS</b>	<b>PM LOS</b>
Existing (2009)	<b>A</b>	<b>A</b>
Future No-Build (2013)	<b>A</b>	<b>B</b>
Future Build (2013)	<b>B</b>	<b>B</b>

The northern leg of this intersection serves as the I-85 southbound off-ramp with two-way traffic to provide access to Intercross Road. The intersection currently operates at a LOS A during both the AM and PM peak hour. With the additional site traffic, the intersection will operate at an acceptable LOS B for both the AM and PM peak hour under the 2013 Build Condition. Therefore no improvements are recommended or required for this intersection.

Glenn School Road and Glenn Road (unsignalized)

The following table summarizes the LOS for this stop-controlled intersection.

<b>Scenario</b>	<b>AM LOS (delay in seconds)</b>	<b>PM LOS (delay in seconds)</b>
Existing (2009)	<b>A (9.5)*</b>	<b>B (10.2)*</b>
No-Build (2013)	<b>B (10.7)*</b>	<b>B (11.4)*</b>
Build (2013)	<b>B (11.4)*</b>	<b>B (12.0)*</b>

\* Unsignalized operation, with LOS reported for the worst approach (westbound).

The intersection currently operates at a LOS A during the AM peak hour and a LOS B during the PM peak hour. With the additional site traffic, the intersection will operate at an acceptable LOS B for both the AM and PM peak hour under the 2013 Build Condition. Therefore no improvements are recommended or required for this intersection.

Glenn School Road and Site Driveway #1 (full access, unsignalized)

The following table summarizes the LOS for this stop-controlled intersection.

<b>Scenario</b>	<b>AM LOS (delay in seconds)</b>	<b>PM LOS (delay in seconds)</b>
Build (2013)	<b>B (10.6)*</b>	<b>B (10.6)*</b>

\* Unsignalized operation, with LOS reported for the worst approach (northbound).

The northbound approach on Site Driveway #1 would operate at an acceptable LOS B during both the AM and PM peak hour with site traffic and the following recommended improvements:

- Construction of a westbound left-turn lane on Glenn School Road with 100 feet of minimum storage; and
- Construction of Site Driveway #1 with one ingress lane, two egress lanes with an appropriate internal tangent throat distance.

With the future construction of Northern Durham Parkway, this access may be limited to right-in/right-out only.

Glenn School Road and Site Driveway #2 (left-over access, unsignalized)

The following table summarizes the LOS for this stop-controlled intersection.

Scenario	AM LOS (delay in seconds)	PM LOS (delay in seconds)
Build (2013)	<b>B (10.8)*</b>	<b>B (11.2)*</b>

\* Unsignalized operation, with LOS reported for the worst approach (northbound).

The northbound approach on Site Driveway #2 would operate at an acceptable LOS B during both the AM and PM peak hour with site traffic and the following recommended improvements:

- Construction of a westbound left-turn lane on Glenn School Road with 100 feet of minimum storage; and
- Construction of a monolithic concrete median (left-over type median) on Glenn School Road to prohibit northbound left-turns from Site Driveway #2 onto westbound Glenn School Road; and
- Construction of Site Driveway #2 with one ingress lane, one egress lane with an appropriate internal tangent throat distance.

With the future construction of Northern Durham Parkway, this access may be limited to right-in/right-out only.

### **Summary of TIA Required Improvements**

Glenn School Road and I-85 NB Ramps

1. Install a traffic signal with interconnect cable to the I-85 SB ramp and Glenn View Station intersections (subject to MUTCD warrants and approval by NCDOT).

Glenn School Road and Site Driveway #1

1. Construction of a westbound left-turn lane on Glenn School Road with adequate storage and appropriate tapers.
2. Construction of Site Driveway #1 with one ingress lane, two egress lanes with an appropriate internal tangent throat distance.
3. With the future construction of Northern Durham Parkway, this access may be limited to right-in/right-out only.

#### Glenn School Road and Site Driveway #2

1. Construction of a westbound left-turn lane on Glenn School Road with adequate storage and appropriate tapers.
2. Construction of a monolithic concrete median (left-over type median) on Glenn School Road to prohibit northbound left-turns from Site Driveway #2 onto westbound Glenn School Road.
3. Construction of Site Driveway #2 with one ingress lane, one egress lane with an appropriate internal tangent throat distance.
4. With the future construction of Northern Durham Parkway, this access may be limited to right-in/right-out only.